Graphite Foam Heat Exchanger for FASTER Fuel Reformer

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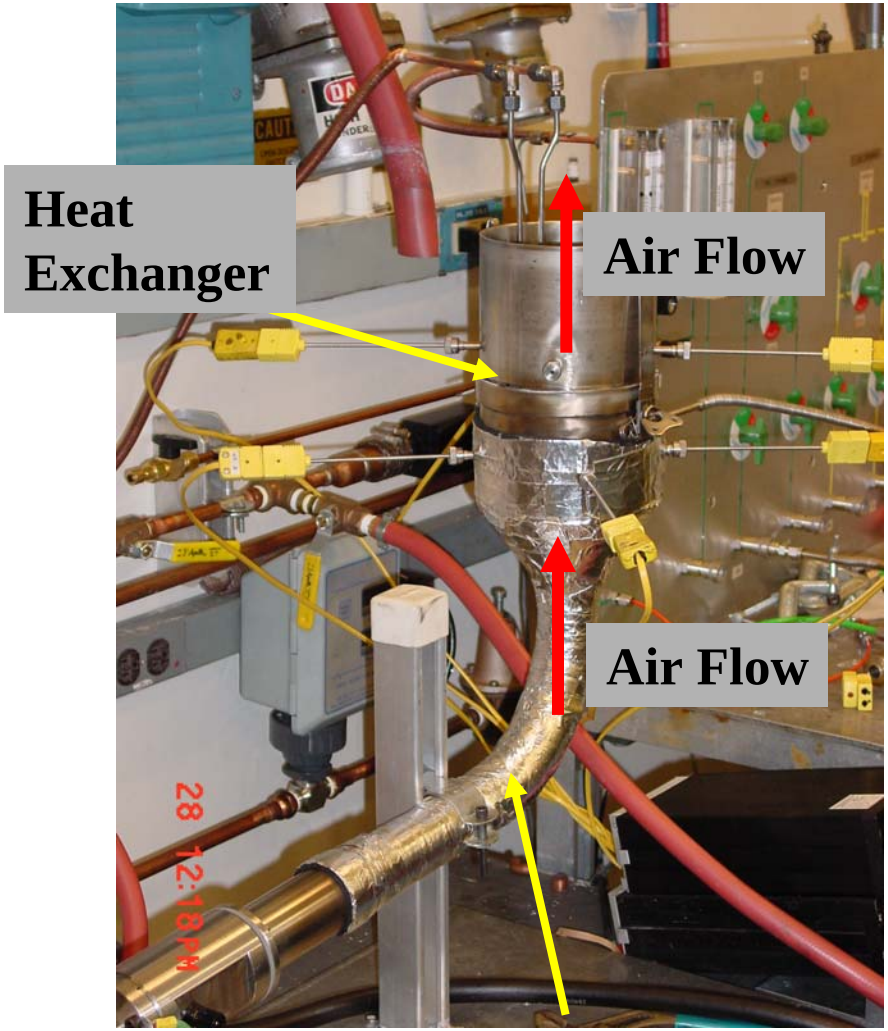
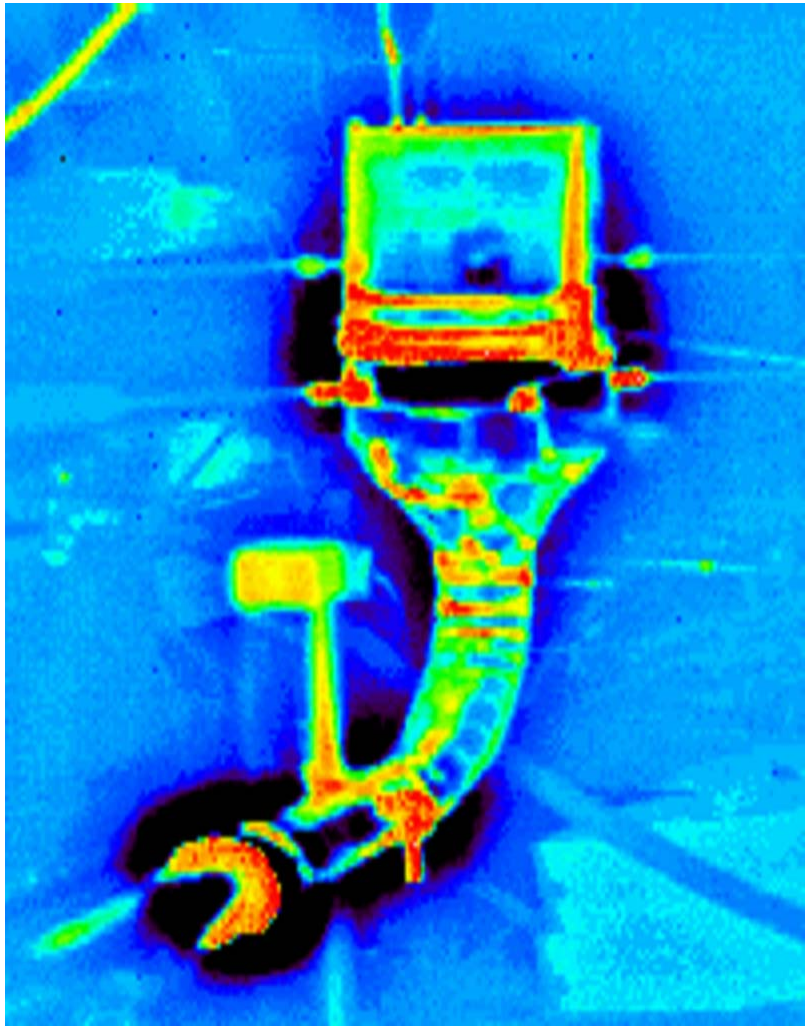
UT-BATTELLE

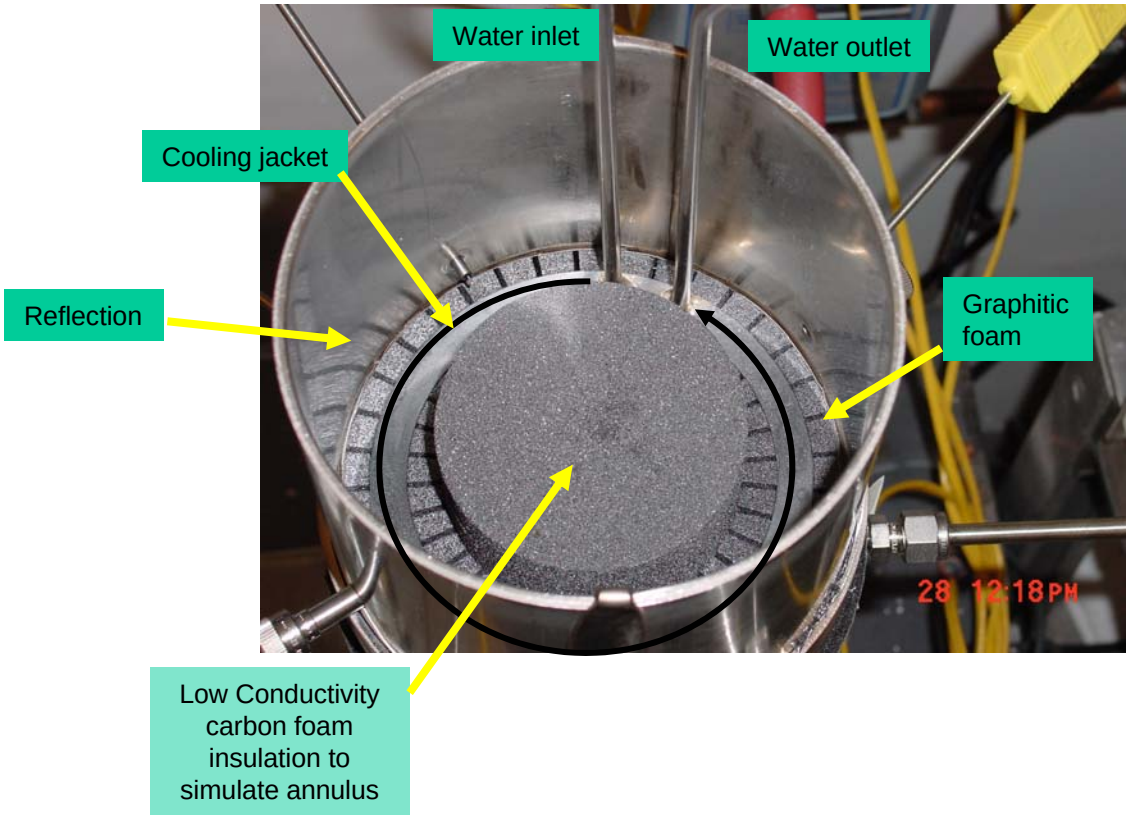
Heat Exchanger During Operation





Hot air stream

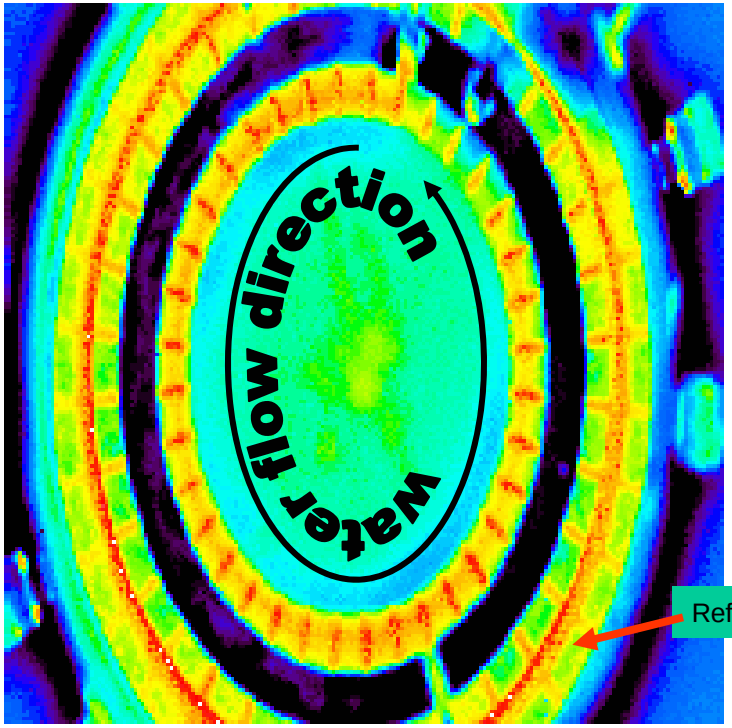
Heat Exchanger Design

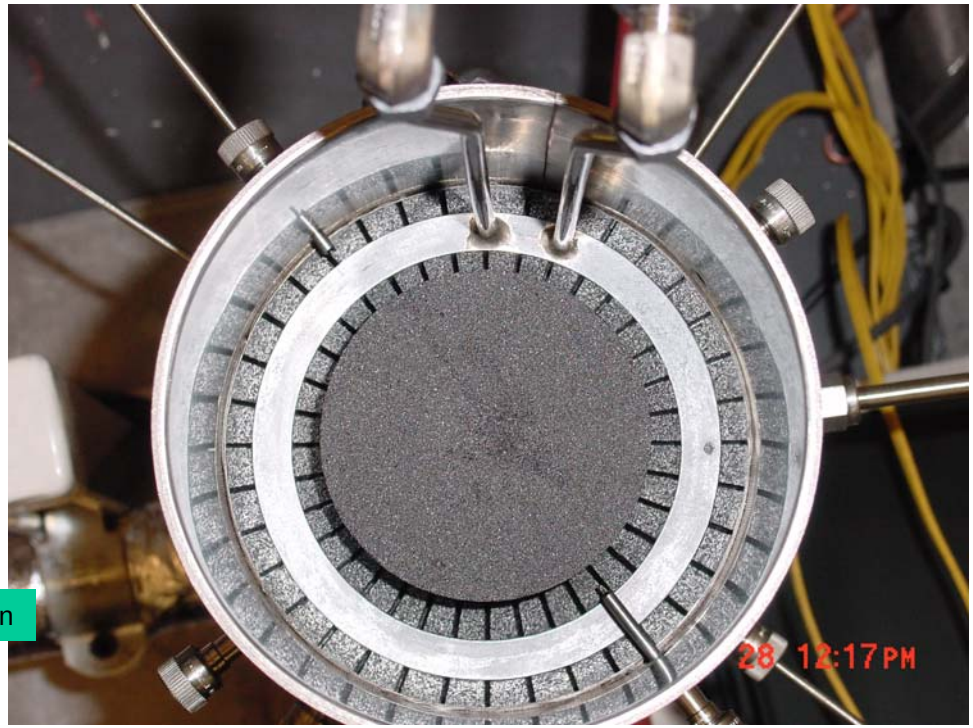


Requirements

- **DP less than 0.1 psi**
- **Gas Flow – 300 slpm**
- **Two phase coolant flow**
- **Minimum of 100C temperature change in gas flow**

Heat Exchanger Results





Results

- **ΔP less than 0.04 psi**
- **Gas Flow – 307 slpm**
- **Two phase coolant flow achieved**
- **Nearly 200C gas temperature change**
  - **350C inlet gas temp**
  - **147C outlet gas temp**

Results are very promising

- Results are promising:
  - Cooling jacket was simply press fit into foam – no metalization and joining required
  - Temperature change was significantly larger than needed, thus allowing for optimum temperature control
  - Uniformity in heat distribution was excellent
    - ➔ Temperature on the inside of the ring appears higher than outside, indicating more gas flow here.
    - ➔ The webs of the heat exchangers are thinner here than on the outer edge, thus lower pressure drop and higher flow.
  - Flow distribution appears to allow for good mixing of gases